

Scotland's Rural College

Determining priority welfare issues for cats in the United Kingdom using expert consensus

Rioja-Lang, Fiona; Bacon, Heather; Connor, Melanie; Dwyer, CM

Published in:
Veterinary Record Open

DOI:
[10.1136/vetreco-2019-000365](https://doi.org/10.1136/vetreco-2019-000365)

Print publication: 02/11/2019

Document Version
Publisher's PDF, also known as Version of record

[Link to publication](#)

Citation for pulished version (APA):

Rioja-Lang, F., Bacon, H., Connor, M., & Dwyer, CM. (2019). Determining priority welfare issues for cats in the United Kingdom using expert consensus. *Veterinary Record Open*, 6(1), [e000365].
<https://doi.org/10.1136/vetreco-2019-000365>

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal ?

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Determining priority welfare issues for cats in the United Kingdom using expert consensus

Fiona Rioja-Lang,¹ Heather Bacon,¹ Melanie Connor,¹ Cathy Mary Dwyer ^{1,2}

To cite: Rioja-Lang F, Bacon H, Connor M, *et al.* Determining priority welfare issues for cats in the United Kingdom using expert consensus. *Veterinary Record Open* 2019;**6**:e000365. doi:10.1136/vetreco-2019-000365

Received 10 July 2019
Revised 25 September 2019
Accepted 01 October 2019

ABSTRACT

Background Cats are the most popular pets in the UK, yet relatively little research has been conducted into the welfare of cats living in a home environment. The purpose of this study was to determine and prioritise welfare issues for cats using a Delphi method.

Methods Cat welfare experts (n=14) were asked to identify and rank welfare issues for cats in the UK. An initial list of 118 welfare issues was generated by an anonymous online discussion board of experts and thematic analysis using NVivo. Subsequently experts ranked the list of welfare issues according to severity, duration and prevalence using a 6-point Likert scale. All issues with a median score of 3 or above (n=43) were included in the second survey to determine agreement on the rankings of issues. Finally, a subsection of experts attended a two-day workshop to discuss the welfare rankings and determine the final prioritised list of welfare issues.

Results The issues considered to be the most severe and/or likely to cause prolonged cat suffering included social behaviour issues, diseases of old age, obesity, owners not seeking veterinary care and poor pain management. The welfare issues perceived to be most prevalent included neglect/hoarding, delayed euthanasia, inherited conformational defects/diseases, social or environmental restriction, and poor pain management.

Conclusions The outcomes suggested that, although issues such as cat behaviour required further research, owner education was an important factor in improving cat welfare.

INTRODUCTION

Cats are now the most popular pets in the UK, with approximately 11 million pet cats.¹ In addition, there is a significant population of unowned cats, consisting of 'free-living' cats (also referred to as stray or feral) and cats in the care of animal welfare organisations. For example, estimates of the numbers of cats entering animal shelters as unwanted or stray animals were around 130,000 in 2009 and more than 150,000 in 2010,^{2,3} or about 1 per cent of the owned population per year. Unusually for companion animals in the UK, the owned cat population is often allowed to free-roam, which means that the pet cat and free-living cat populations may intermingle. The Animal Welfare Act (2006) (covering England and Wales), Animal Health and

Welfare Act (2006) (Scotland) and Welfare of Animals Act (2011) (Northern Ireland) outline a Duty of Care to animals, including companion animals, and that those responsible for the welfare of both the owned and unowned cat populations have a requirement to ensure their needs are met. However, in comparison with farmed species and with dogs, relatively few studies have been conducted into the welfare of cats.

Those studies that have addressed cat welfare have focused predominantly on management of the unowned cat population, for example, the impact of Trap-Neuter-Return programmes, and the welfare of cats in shelters.^{4,5} Only within the last 10 years or so have studies started to be conducted that have addressed the welfare of cats in the domestic environment, for example, the welfare of cats in multicat households,⁶ problem behaviours such as inappropriate elimination or scratching,⁷ welfare consequences of breeding for flat-faces,⁸ and recognition and treatment of pain.⁹ Although there have been studies which have attempted to define and prioritise welfare issues for other companion animals, such as dogs¹⁰ and horses,¹¹ to the authors' knowledge no previous study has attempted to do this for cats.

Identifying priorities in animal welfare follows from the premise that, where the animals' capacities to suffer can be assumed, the most pressing issues are determined by the severity and duration of suffering and the number of animals affected.¹² One efficient way of determining welfare priorities, particularly where there are limited scientific data, is to use expert opinions, implementing methods such as the Delphi approach. In the Delphi research methodology, experts participate in several rounds of surveys, gradually working towards reaching a consensus. These are often conducted anonymously, which can facilitate drawing out honest opinions, and are based on the understanding that expert consensus may more accurately represent



© British Veterinary Association 2019. Re-use permitted under CC BY-NC. No commercial re-use. Published by BMJ.

¹Jeanne Marchig International Centre for Animal Welfare Education, The University of Edinburgh Royal Dick School of Veterinary Studies, Edinburgh, UK

²Animal Behaviour and Welfare, Scotland's Rural College, Edinburgh, UK

Correspondence to

Dr Cathy Mary Dwyer; cathy.dwyer@ed.ac.uk

the status quo than individually held views. Experts can consist of a range of welfare stakeholders, including animal caretakers, animal owners, veterinarians, policy makers and so on. Resources for tackling animal welfare issues are often limited; therefore, obtaining a consensus of expert opinion on the most pressing issues to address is a valuable approach to try and ensure that resources are wisely spent.¹³

The aim of this study was first to use expert opinion to determine a comprehensive understanding of the welfare issues for cats (including pet cats and unowned cats) in the UK, and secondly to use a modified Delphi method to generate expert consensus on ranking these welfare issues. The results reported here are part of a larger study to determine priority animal welfare issues of managed species in the UK.

METHODS

The study formed part of a larger study to identify and prioritise welfare issues for a range of different species. Methods were as described previously¹⁴ and are summarised here.

Recruitment of experts

Experts were recruited from a range of stakeholders (eg, veterinarians, academics, charity sector employees, industry representatives and so on) by convenience and snowball sampling. An expert was defined as someone who had worked in their field of expertise for more than three years and was based in the UK. Expert participation in the study was anonymous (except for the workshop) and voluntary.

Priority welfare issue lists

In order to capture all potential welfare outcomes and risk factors, a 'Delphi Conference' via an online discussion board was used to generate a list of cat welfare concerns. The comments and issues generated by the experts were subjected to thematic analysis, using NVivo, to derive a list of all potential concerns regarding the welfare of pet cats. Initially the text derived from the discussion boards was coded and 23 welfare-related codes were identified by inductive reasoning. Thematic analysis then sorted these codes into one of nine nodes, where similar characteristics or levels of welfare concern emerged. Finally, within each node, the text was scrutinised and redundancies or repeated themes were removed. The final list was reviewed by two assessors before the first online survey.

Questionnaire design

Two rounds of online surveys were conducted using the Online Survey tool (formerly Bristol Online Survey) and were completed anonymously. At the beginning of the study, demographic data were collected, including year of birth, gender, profession and highest level of education. Participants were asked to score each of the potential welfare issues derived from the thematic analysis for severity (defined as the likely maximum severity

associated with the welfare issue in the expert's opinion), duration (defined as the likely proportion of the animal's life which would be affected by the welfare issue in the expert's opinion) and prevalence (defined as the expert's perceived proportion of the population affected by the welfare issue) separately on 6-point Likert scales, where 1=never/none and 6=always/high.

The welfare issues which scored a median neutral-high response (scores 3–6 on the Likert scale) were carried forward into round 2. In the second round, experts were presented with the reduced, ranked lists and asked to agree or disagree with the position of each issue. Agreement between experts for rank order was determined by calculating Fleiss' kappa coefficients.

Workshop

The final stage of the process was a workshop. Twenty-one experts participated in a series of small group (species specific) and large group (to identify cross-cutting issues) exercises and discussions in order to finalise and rank the priority welfare lists for cats. The workshop participants were drawn from the larger pool of 145 experts who had already been involved in the online components of the Delphi for cats or other species, and included two cat welfare specialists. In addition, 10 of the other experts in attendance were companion animal experts, and all participants had expertise in animal welfare in general, therefore were able to competently give an expert opinion on cat welfare issues during the group discussions.

RESULTS

Expert characteristics

The final number of experts recruited was 14. Experts had a mean age of 42 years (sd=8.12) and were predominantly female (10 females, four males). They consisted of 27 per cent charity or non-governmental organisation workers, 24 per cent veterinarians, 16 per cent behaviourists/trainers, 12 per cent researchers, 9 per cent veterinary nurses, and 6 per cent working for the pet trade and industry organisations, as well as 6 per cent who were classified as 'other'. More than half (55 per cent) of experts held a postgraduate qualification (41 per cent PhD, 14 per cent master's degree), 36 per cent had a bachelor's degree and 9 per cent had achieved other qualifications. Response rates for the online surveys were 86 per cent for round 1 and 79 per cent for round 2.

Discussion board

The cat experts generated a very comprehensive list of welfare concerns through the discussion board (3213 words). From the thematic analysis a concise list of 118 specific welfare issues (table 1), covering nine broad themes, was generated in preparation for the first survey.

Round 1 online survey

The median scores given to the welfare issues are shown in table 2 (for those issues that scored above a median of 3, and so were judged by the experts to be at least somewhat

Table 1 Cat welfare issues as derived from thematic analysis of online discussion boards (unranked)

Category of concern	Welfare issue
Health and veterinary issues	<ol style="list-style-type: none"> 1. Not seeking veterinary care. 2. Delayed end-of-life decisions. 3. Unrecognised/untreated pain (chronic). 4. Toxicity/accidental poisoning (eg, permethrin, lilies, etc). 5. Common feline health issues, including dental disease, system-based disorders, urinary tract, parasites, etc. 6. Common feline infectious diseases, especially Feline Herpes Virus, Feline Calicivirus, Feline Parvovirus and Feline Infectious Peritonitis. 7. Diseases of ageing population, especially osteoarthritis, hyperthyroidism and renal disease ('hidden' conditions). 8. Lack of disease management for stray/community cats. 9. Physical trauma, for example, Road Traffic Accident, airguns, dog attacks, etc. 10. Increased risk of rabies, etc, from relaxed PETS passport regulations (2012). 11. Poor dental care. 12. Cat bite abscesses. 13. Poor diagnosis of breed-related issues due to lack of exercise (eg, exercise-induced respiratory distress in brachycephalic cats). 14. Homeopathy as alternative treatment. 15. Obesity (especially for indoor cats). 16. Lack of basic veterinary care (eg, vaccinations, neutering, etc). 17. Lack of accessibility to subsidised preventive healthcare. 18. Some veterinary care highly focused on physical health at expense of overall welfare ('life at all costs' mentality). 19. Insufficient access to veterinary clinics ('cold spots' in poorer communities). 20. Not accessing veterinary care (eg, logistics, cat fear, owner fear, perceived overselling). 21. Lack of professional consensus on welfare issues (eg, Feline Immunodeficiency virus, neutering, vaccination). 22. Lack of understanding of some vets of impact of length of stay on welfare. 23. Lack of feline-specific licensed veterinary products. 24. Lack of knowledge about feline-specific medicinal products. 25. Veterinary Medicines Directive is very restrictive over the use of non-licensed medicinal products (can create welfare issues). 26. Non-compliance (of owners) with veterinary instruction/medication. 27. Poor pain management, including lack of postoperative care following routine surgeries. 28. Inappropriate transportation of cats to vets (ie, no box/in a blanket). 29. Turning to social media as the first point of call for cat care advice (vet diagnosis, medicinal advice, dosage rates). 30. Research gaps (eg, optimal use of analgesics, extreme procedures to prolong life). 31. Research gaps in of cats with disabilities, for example, paralysis, urinary/faecal incontinence. 32. Teaching hospitals working up sick cats more than necessary for teaching students.
Housing and environment	<ol style="list-style-type: none"> 1. Chronic stress (may result in excessive grooming). 2. Lack of exercise (especially for indoor cats). 3. Vegetarian and vegan cat diets (possible?). 4. Poor nutrition/diet. 5. Enforced group living (naturally solitary living). 6. Increasing cat density: close proximity due to modern home/estate design. 7. Inappropriate home environment, for example, number of key resources (litter trays, scratching posts, etc). 8. Inappropriate kitten socialisation. 9. Change of environment, for example, moving house, relinquishment, cat shows. 10. Lack of control over environment (eg, no cat flap). 11. Poor environmental enrichment and inappropriate access to essential resources. 12. Cats taken to unfamiliar environments for assisted animal intervention programmes: can be very stressful (handling by unfamiliar people and new environment). 13. Electronic containment fences. 14. Exposure to fireworks while either indoors or outdoors.
Breeding and reproduction	<ol style="list-style-type: none"> 1. High mortality in stray kittens. 2. Too many unsterilised queens. 3. Inappropriate pedigree breeding leading to inherited and chronic disorders. 4. Unregulated breeding/overpopulation (eg, too many cats in UK, not enough homes). 5. Insufficient timely neutering (due to vet/owner perceptions and myths). 6. Early litters due to late sterilisation. 7. Trying to keep fetuses (not full term) alive from a pregnant spay. 8. Early weaning. 9. Hand rearing. 10. Lack of scientific knowledge on best hand rearing practices.

Continued

Table 1 Continued

Category of concern	Welfare issue
Unowned cats and shelters	<ol style="list-style-type: none"> 1. Crowded shelter environments (especially during kitten season) and lack of rehoming leading to disease outbreaks (eg, cat flu). 2. Management of unowned, stray and feral cats. 3. 'Rescuing' feral cats and trying to rehome them to a domestic environment, can take months/years of distress. 4. Lack of owner knowledge about what to do with healthy stray cats. 5. Lack of definition and regulation of rescues, boarding catteries, etc. 6. Loss or abandonment (exacerbated by lack of visible identification). 7. Uncertainties around legal status and 'ownership' of cats (affects attitudes towards responsibility and ownership, affects speed of rehoming). 8. Long stay in rescue facilities. 9. Shelter design limitations that do not provide choice and control (eg, lack of outdoor space and places to hide and get up high, visibility to other cats).
Behaviour and training	<ol style="list-style-type: none"> 1. Behavioural restrictions, for example, house cats and cats in pens (eg, rescues, stud cats, pet shops, cat shows, etc). 2. Inappropriate human interaction (eg, inappropriate play, flooding). 3. Not accessing behavioural care/support (eg, lack of awareness, costs, poor bond). 4. Aversive training methods, for example, spray with water, rubbing their nose in urine, etc. 5. Electronic training aids and invisible electric fences (to be banned?). 6. Lack of knowledge of learning theory and how to apply it. 7. Inappropriate rehabilitation, for example, flooding. 8. Unwanted behaviour, for example, spraying outside of litterbox. 9. Negative affective states (eg, fear, anxiety, frustration, pain, acute and/or chronic stress). 10. The belief that 'hiding under the bed' is 'normal' behaviour and therefore acceptable. 11. Territorial disputes. 12. Dominance myth (alpha status) in cats (eg, owners trying to 'dominate' cat).
Knowledge and understanding	<ol style="list-style-type: none"> 1. General lack of feline behavioural knowledge by owners. 2. Unqualified 'behaviourists and trainers' giving out damaging advice. 3. General lack of feline health knowledge, including incorrect health and welfare advice given by breeders. 4. Lack of knowledge of where to seek professional behavioural help. 5. Lack of owner knowledge about local schemes (eg, neutering for reduced cost). 6. Lack of knowledge of the Animal Welfare Act 2006 (meeting all cat welfare needs). 7. Owners' lack of knowledge of what to do when their cat goes missing. 8. Lack of human understanding of the ethology of the cat. 9. Lack of human understanding on how the sensitive/socialisation period impacts cats' lives. 10. Misconceptions of feline emotions and motivations (eg, saying the cat is spiteful, etc).
General care and handling	<ol style="list-style-type: none"> 1. Hoarding. 2. Neglect (eg, matted coats and overgrown claws). 3. Inappropriate handling, for example, scruffing and clipnosis. 4. Historical cat care (eg, older owners who are unwilling to adapt to new advice). 5. Inappropriate grooming regimens of longhaired cats. 6. Inappropriate litter hygiene (cleaning routine). 7. Inappropriate interaction: owners not caring that their cats do not want to be picked up/cuddled, etc. 8. Owners going on holiday, etc, and leaving cats with enough food to last them and no other care provisions in place. 9. 'Stealing' other people's cats, for example, feeding other's cats and encouraging them into their homes can lead to obesity, unknown allergies, abandonment if ownership becomes unclear. 10. Long-haul travel, for example, holidays, emigrating or importing 'rescue' cats into UK.
Media representation/cat uses	<ol style="list-style-type: none"> 1. Cat cafés: stressful? 2. Inappropriate anthropomorphism (eg, social media, 'funny' cat videos on YouTube). 3. Inappropriate media representation (eg, cats and cucumbers, cats in clothes). 4. Cats as school pets. 5. The welfare of cats used during filming (eg, stress levels, too hot under lights, excessive noise levels, long travel times, poor training, poor handling). 6. Inappropriate messaging using cats in advertising. 7. Cats used in circuses and shows. 8. Cats/kittens being sold over the internet (eg, Preloved, Gumtree, Facebook). 9. Celebrity culture reinforcing poor welfare (eg, popularising brachycephalic breeds). 10. Social media forums where lay people offer advice (often inappropriate), discouraging owners/carers to seek expert advice.
Other issues	<ol style="list-style-type: none"> 1. Lack of registration requirements/compulsory microchipping which reduces abandonment. 2. Claw caps. 3. No clear regulatory body for behaviourists/trainers to be recognised by Defra, RCVS, etc. 4. No clear regulation and guidelines for other industries, for example, groomers, rescue charities. 5. Advertisement of ineffective products in major pet store chains. 6. Religion (eg, medicine and surgery not in line with some beliefs and values). 7. Cultural differences in relation to cats as pets. 8. Inappropriate product messaging (eg, food bowls and mats saying 'boss cat'). 9. Limited research and unregulated sale and use of cat deterrents, for example, ultrasonic devices? 10. Limited research and unregulated sale of antihunting devices, for example, bibs. 11. Limited research on true impact of predation on wildlife (antecat lobbies, etc).

RCVS, Royal College of Veterinary Surgeons.

Table 2 Ranking of welfare issues from first online survey completed by cat experts, based on experts' perception of the prevalence, severity and duration of each welfare issue

Rank order	Prevalence	Median	Severity	Median	Duration	Median
1	Social behaviour issues (eg, increased cat density due to modern estate design, enforced group living, etc).	4.72	Hoarding.	5.27	Hoarding.	5.2
2	No regulation of establishments or service providers (eg, shelters, groomers, behaviourists, etc).	4.67	Long stay in shelter.	5.00	Genetic issues (eg, brachycephaly, etc).	4.78
3	Use of cats in social and other media.	4.67	Accidental poisoning.	4.82	Negative affective states (eg, fear, pain, frustration, chronic stress).	4.77
4	Negative affective states (eg, fear, pain, frustration, chronic stress).	4.67	Physical trauma.	4.82	Behavioural restriction (eg, house cats, cat shows, rescues, etc).	4.70
5	Lack of research/knowledge of feline welfare needs.	4.22	Lack of compulsory microchipping.	4.73	Common feline infectious diseases.	4.70
6	Lack of feline behavioural knowledge by owner.	4.17	Negative affective states (fear, pain, frustration, chronic stress).	4.69	Diseases of old age.	4.70
7	Not seeking veterinary care (including logistics, fear of overselling, cat fear, etc).	4.08	Delayed euthanasia.	4.67	Inappropriate diets/nutrition (eg, poor nutrition, vegan diets, etc).	4.60
8	Obesity.	4.06	Poor pain management.	4.55	Social behaviour issues (eg, increased cat density due to modern estate design, enforced group living).	4.57
9	Stray cat management.	4.03	Poor shelter design.	4.46	Cats sold on internet.	4.33
10	Poor cat shelter design.	3.97	Inappropriate training methods.	4.12	Obesity.	4.20
11	Poor health knowledge in owners.	3.99	Indiscriminate breeding.	4.09	Common feline health issues (eg, dental disease, system diseases, parasites, etc).	4.18
12	Lack of disease management for stray cats.	3.93	Cats sold on internet.	4.09	Long stay in shelter.	4.1
13	Lack of basic routine veterinary care (eg, vaccinations, neutering, check-ups, etc).	3.92	Neglect.	4.05	Lack of basic routine veterinary care (eg, vaccinations, neutering, check-ups, etc).	4.02
14	Lack of veterinary profession consensus on welfare issues (eg, FIV, neutering, etc).	3.88	Social behaviour issues (eg, increased cat density due to modern estate design, enforced group living, etc).	4.05	Cultural differences in relation to cats as pets.	4.00
15	Cats sold on internet.	3.85	Behavioural restrictions (eg, house cats, cat shows, rescues, etc).	4.00	Lack of research into common cat health issues.	4.00
16	Diseases of old age.	3.83	Diseases of old age.	4.00	Indiscriminate breeding.	3.99
17	Lack of compulsory microchipping.	3.80	Long distance travel.	4.00	Inappropriate home environment/resources.	3.96
18	Lack of cat-specific pain management research.	3.75	Inappropriate diets/nutrition (eg, poor nutrition, vegan diet, etc).	4.00	Lack of feline behavioural knowledge by owner.	3.93
19	Behavioural restrictions (eg, house cats, cat shows, rescues, etc).	3.75	Lack of disease management for stray cats.	3.97	No regulation of establishments or service providers (eg, shelters, groomers, behaviourists, etc).	3.73
20	Early weaning and hand rearing.	3.69	No regulation of establishments or service providers (eg, shelters, groomers, behaviourists, etc).	3.82	Lack of cat-specific pain management research.	3.70
21	Fireworks.	3.67	Common feline infectious disease.	3.82	Lack of compulsory microchipping.	3.70
22	Long stay in shelter.	3.67	Fireworks.	3.82	Early weaning and hand rearing.	3.64
23	Lack of feline-specific medicines.	3.55	Lack of basic routine veterinary care (eg, vaccinations, neutering, check-ups, etc).	3.78	Lack of disease management for stray cats.	3.62

Continued

Table 2 Continued

Rank order	Prevalence	Median	Severity	Median	Duration	Median
24	Abandonment.	3.55	Lack of feline health knowledge by owners.	3.73	Cats used as school/office pets.	3.60
25	Inappropriate training methods.	3.54	Lack of feline behavioural knowledge by owner.	3.70	Poor shelter design.	3.55
26	Neglect.	3.51	Common feline health issues (eg, dental disease, system-based disorders, parasites, etc).	3.65	Delayed euthanasia.	3.54
27	Physical trauma.	3.33	Cats used in veterinary teaching.	3.64	Inappropriate grooming.	3.50
28	Cultural differences in relation to cats as pets.	3.33	Inappropriate home environment/resources.	3.63	Stray cat management.	3.50
29	Poor pain management.	3.21	Animal assisted therapy.	3.60	Lack of knowledge of feline welfare needs.	3.48
30	Common feline infectious diseases.	3.00	Lack of research into common cat health issues.	3.59	Lack of veterinary profession consensus on welfare issues (eg, Feline Immunodeficiency virus, neutering, etc).	3.48
31			Abandonment.	3.55	Claw caps.	3.44
32			Not seeking veterinary care (including logistics, fear of overselling, cat fear, etc).	3.52	Use of cats in social and other media.	3.43
33			Use of cats in social and other media.	3.47	Not seeking veterinary care (including logistics, fear of overselling, cat fear, etc).	3.36
34			Lack of research/knowledge of feline welfare needs.	3.45	Neglect.	3.35
35			Claw caps.	3.45	Abandonment.	3.30
36			Obesity.	3.42	Poor health knowledge in owners.	3.30
37			Inappropriate handling.	3.32	Inappropriate training methods.	3.22
38			Inappropriate grooming.	3.27	Cats and wildlife conflict.	3.13
39			Early weaning and hand rearing.	3.26		
40			Stray cat management.	3.22		
41			Cats and wildlife conflict.	3.14		
42			Lack of veterinary professional consensus on welfare issues (eg, FIV, neutering, etc).	3.11		
43			Cultural differences in relation to cats as pets.	3.00		

important) for the prevalence, severity and duration of each welfare issue. Of the 118 welfare issues shown in [table 1](#), median scores of 3 or above were given to 30, 43 and 38 issues for prevalence, severity and duration, respectively.

Round 2 online survey

Overall the agreement with ranking for the perceived prevalence, severity and duration of cat welfare issues was fair (Fleiss' kappa, $\kappa=0.323$, $\kappa=0.333$, $\kappa=0.364$ for prevalence, severity and duration, respectively). Of the top issues for perceived prevalence, experts agreed that social behaviour issues, negative affective states and lack of research or knowledge of feline welfare needs should be ranked within the top 5 issues, but felt that lack of

regulation and portrayal of cats in social media were less prevalent, and that obesity was more prevalent. For the severity of welfare issues, experts generally did not agree with the top-ranking issues from the first survey, and considered delayed euthanasia, neglect and social behaviour issues were more severe than their ranking, and that hoarding, lack of compulsory microchipping and shelter design had less impact than as ranked. There was generally good agreement about the position of the top 10 issues for the duration of the welfare issue, although the impact of hoarding and selling cats on the internet were considered less important, and social behaviour issues and obesity to be more important than their ranking.

Table 3 Ranked welfare priority issues of cats determined using a Delphi method, considering the welfare of individual cats (experts' judgement of severity and duration combined) and the UK cat population (experts' perception of current prevalence)

Species	Ranking	Priority welfare issues	
		Severity x duration	Prevalence
Cats	1	Social behaviour issues relating to inappropriate home environment.	Neglect /hoarding.
	2	Diseases of old age.	Delayed euthanasia.
	3	Obesity.	Inherited diseases and conformation issues.
	4	Not seeking veterinary care when required.	Social and environmental restriction leading to inappropriate behaviours.
	5	Poor pain management.	Poor pain management.
	6	Shelter issues (including long stays, chronic stress, etc).	Diseases of old age.
	7	Unowned cat population.	Not seeking veterinary care when required.
	8	Delayed euthanasia.	Obesity.
	9	Neglect/hoarding.	Shelter issues (including long stays, chronic stress, etc).
	10	Inherited diseases and conformation issues.	Inadequate stray cat management (including overpopulation).

Workshop

The final priority lists for cats that were generated during the workshop are shown in table 3. The likely severity and duration of welfare issues were considered together (considering the welfare of individual cats), and perceived prevalence of a welfare issue was considered alone (considering the welfare of the population of cats in the UK).

DISCUSSION

Overall, the welfare issues of cats that caused the greatest concern, in both the rounds of surveys and in the final workshop, included a number of risk factors for poor welfare (eg, inappropriate home environments, not seeking veterinary care, long stays in shelters, neglect or hoarding), as well as welfare outcomes (eg, obesity, diseases of old age, inherited conformation issues, delayed euthanasia). These may lead to negative affective states, as considered to be prevalent in the online surveys, but these states were not specifically identified in the workshop outcomes. In addition, lack of research and/or knowledge of feline welfare needs was perceived to be prevalent in the online surveys, and may contribute to the welfare risks of not seeking veterinary care when required, poor pain management and an inappropriate home environment, identified as important in both the online surveys and the workshop.

Social behaviour and environmental restriction

Social behaviour issues resulting from an inappropriate home environment were perceived to be the most important welfare concern for individual cats, and social and environmental restriction was considered the fourth most common issue. When local resources are good, cats form complex social affiliations, such that unrelated, but familiar, cats can be kept in the same home environment.¹⁵ However, disruption of the social group can occur

when new animals are introduced, resulting in aggression, which is considered to be common in domestic cats and a source of social stress.¹⁶ Inadequate numbers or distribution of resources (such as food bowls or litter trays) can also result in behaviours such as elimination outside of litterboxes, which owners find unacceptable,⁷ and may be a sign of social stress in the cat. Although keeping cats in a multicat household is frequently considered a source of social stress, studies comparing singly housed cats with multicat housing in shelters¹⁷ or in domestic settings^{6 18 19} have failed to provide convincing evidence that housing with other cats causes stress. In addition, providing environmental enrichment does not increase competition or aggression between cats,⁵ although owner lifestyle factors may contribute to feline stress.⁶ However, further research may be required to understand the sources of social stress in cats housed in a domestic setting, as the majority of research has been conducted in shelter environments.

Another common cause of behavioural problems is environmental restriction, by housing cats in an environment that does not fulfil their behavioural needs. Increasing numbers of cats are kept indoors permanently, as an attempt to reduce straying or road traffic accidents, or in response to concerns about the impact of cats on wildlife. Behavioural problems are more common in confined cats compared with free-roaming animals,²⁰ suggesting that the confined environment often does not meet behavioural needs. The provision of a suitable environment, with opportunities to express most normal behaviours and with protection from conditions likely to lead to fear and distress, requires the application of environmental enrichment techniques.²¹ However, although there have been several studies of the behaviour of feral or colony cats, the number of studies that have looked specifically at the behaviour of cats in the domestic environment is rather few,²² but could be beneficial to improve cat welfare.

Behavioural problems in cats can be a risk factor for relinquishment to shelters. A study of the factors contributing to cats being given up to shelters²³ suggested that 7 per cent of cats in the UK are relinquished for behavioural reasons, such as aggression between cats in the household, house soiling, aggression towards people, fearful behaviour and scratching. The presentation of feline behavioural problems to veterinary practices and behaviour counsellors is increasing and highlights the need for owner education in feline behaviour and for veterinary understanding of the close links between behaviour and disease.²⁴

Diseases of old age, veterinary care and euthanasia

Diseases of old age, not seeking veterinary care and delayed euthanasia decisions featured on both the individual animal and population level lists generated in the workshop, and are potentially severe and related causes of suffering. Common diseases of old age in cats include hyperthyroidism, arthritis, dental disease, cardiovascular disease, diabetes, kidney disease and cognitive dysfunction.^{25–27} These conditions can cause pain, distress and discomfort in cats. Many of these conditions are treatable, but owners and veterinarians may dismiss changes in behaviour as just a normal part of ‘old age’.^{27,28} Health issues, of old age and other conditions, are exacerbated when cat owners do not seek veterinary care. The number of cats in the UK unregistered with a veterinarian practice or which do not receive routine veterinary care is unknown, although this may represent a sizeable proportion of cats.²⁹

In clinical veterinary practice, euthanasia is regarded as an ethical procedure when the veterinarian considers it inhumane to prolong the extremely painful or poor-quality life of a patient that cannot be relieved by treatment.³⁰ A study in New Zealand suggested that over 90 per cent of elderly pet cats were euthanased when at least one indicator of a reduced quality of life was present, with inappetence and non-specific decline being the most common indicators.³¹ A survey of pet owners suggested that 87 per cent felt euthanasia was appropriate for unmitigated pain.³² Further, cat owners suggested that quality of life was more important in their decision making than longevity, with 93 per cent willing to trade survival time for quality of life.³³ However, owners may refuse euthanasia for a variety of reasons, including guilt, unrealistic expectations or beliefs about pain relief and treatment options, economics, or other reasons, which may prolong animal suffering.

Obesity

Obesity was identified by experts as an important welfare issue for individual cats and considered prevalent among the cat population. Estimates suggest that 25–45 per cent of cats can be overweight and obese.^{34,35} Obesity has been associated with a number of other related health issues, such as diabetes, orthopaedic disease, cardiorespiratory disease and urinary disorders.^{36,37} Risk factors for cats

being overweight or obese include owner attitudes or beliefs about ideal weights, treat giving, feeding mainly dry cat foods and keeping cats indoors.^{35,38} Nutritional programmes (eg, ref³⁹) can successfully reduce obesity. However, owner education and addressing lifestyle issues may also be required for sustained weight loss.

Poor pain management

Feline pain has been undertreated largely due to fear of toxicity of traditional analgesics, lack of pharmaceutical products with market authorisation for this species and poor recognition of pain in cats.⁴⁰ Studies of behavioural-based pain assessments in cats have since been conducted (reviewed by Merola and Mills⁴¹), and composite multidimensional pain scales for cats have been developed and validated, including a facial pain scale.^{42,43} In addition, improved pain management procedures have led to a better understanding of the analgesic requirements of cats.⁴⁴ Despite these advances, poor pain management in cats was still considered by experts to be an important issue for cat welfare.

Inherited diseases and conformation issues

The consequences of breeding decisions, particularly for pedigree animals, which can lead to inherited diseases and conformation issues were perceived by experts to be both a highly prevalent condition and to have an important impact on individual cat welfare. One of the most severe issues is brachycephalic obstructive airway syndrome, a chronic respiratory condition that arises as a consequence of artificial selection for a changed skull shape primarily characterised by a shortened muzzle.⁴⁵ The popularity of breeds with altered skull shapes appears to be increasing, and owner preferences are an important part of this dynamic.⁸ Despite campaigns by the British Veterinary Association and International Cat Care, among others, brachycephalic breeds continue to be extremely popular in the UK, which seems to lead to a preference, in some owners, for compromised dogs and cats over healthy animals.⁴⁶

Neglect and hoarding

In the opinion of the experts the most prevalent welfare issue for cats was neglect and hoarding, as a risk factor for poor cat welfare. Hoarding has been considered the third dimension of animal abuse, alongside deliberate cruelty and neglect, reflecting a flawed human–animal relationship that may be associated with psychological and wellbeing issues in the hoarder.⁴⁷ Hoarding is defined as the accumulation of a large number of animals without providing a minimum standard of nutrition, sanitation and veterinary care; failing to act on the deteriorating condition of the animals and the environment; and where the hoarder is often unaware of the negative effects of the collection on their own health and wellbeing.⁴⁸ A study of hoarding in Spain suggested that, although dogs were the most commonly hoarded animal, cats were also vulnerable, with an average of 50 animals per

case.⁴⁹ Hoarded animals commonly (up to 75 per cent of animals) suffered from poor body condition, wounds, parasites and infectious disease, as well as behavioural problems, particularly aggression and social fear. This clearly represents a risk factor for cat welfare, although scientific studies of the prevalence of cat hoarding in the UK are lacking.

Stray cats and shelters

Other issues considered by the experts to occur frequently for cats included long stays in a shelter, and the related issue of inadequate stray cat management and the subsequent overpopulation of cats in UK. Survey studies in the UK suggest that 156,826 cats were relinquished to 536 organisations in 2010,³ approximately half of which were relinquished by their owners. However, 42 per cent of cats were strays, suggesting a strong relationship between unowned cats and cats in shelters. In UK more than three-quarters of cats are rehomed, although older cats may spend prolonged periods in shelters. Many studies suggest that cats can become stressed when placed in shelters (eg, ref⁵⁰), and there is limited research on optimal shelter design.⁵¹ However, there is some evidence that use of enrichment, particularly to facilitate hiding, can reduce stress associated with shelters.⁵²

Limitations of the approach

Although Delphi studies are popular and can address problems that would otherwise be contentious or intractable, it is important to acknowledge their limitations. Outcomes from a Delphi are based on the agreement between experts, rather than empirical objective data. However this can be valuable in scoping the issues when these data are not readily available. The number of experts in this study was relatively small (this was close to the numbers recommended in some papers, eg, ref⁵³, but lower than others, eg, ref⁵⁴), although these were drawn from a larger pool of 145 experts, and ideally the reliability of the study should be tested with other groups of experts. There is no statistical test for reliability in Delphi studies. However, the outcomes of this study met with the suggested criteria for credibility⁵⁴ as participants were interested and knowledgeable about the field, reasoned discussion and debate were part of the process in the workshop, and supporting data from the literature have been presented here, supporting the validity of the outcomes. As this was the first study of its type, the authors took a broad approach to welfare issues and included both risk factors (such as housing or owner knowledge) as well as welfare outcomes (such as ear disease or reduced life expectancy), which arose from the expert discussions which preceded the ranking. In practice this sometimes was problematic for the experts and did require them to consider the importance of issues that were not necessarily on the same scale. In future work separation of these issues may be beneficial.

CONCLUSIONS

The current study suggests that, based on expert opinion, the main welfare issues for cats in the UK are those relating to lack of knowledge or understanding of cat welfare needs, leading to behavioural issues, pain or cat ill health. Although cat hoarding may be a risk factor for poor cat welfare, this is generally motivated by a desire to care for animals rather than deliberate cruelty. It appears that for many of the cat priority welfare issues (obesity, social behaviour issues, diseases of old age and so on), some research already exists, which could be transferred to cat owners by veterinarians, veterinary nurses or other cat professionals. For other issues, such as shelter and stray cat management, and the behaviour of cats in the domestic home, more research may be needed to improve cat welfare. The benefits of this study include its identification of many of the welfare issues currently considered of concern for pet cats, and its identification of priority areas for further research or educational activities.

Acknowledgements The authors would like to thank the 14 cat welfare experts and the additional 19 animal welfare experts who participated in the workshop.

Funding This study was funded by the Animal Welfare Foundation (AWF). AWF is a fundraising and grant-giving charity (charity number 287118) directed by veterinary professions which uses veterinary knowledge to improve the welfare of animals through science, education and debate. More information can be found at www.animalwelfarefoundation.org.uk.

Competing interests None declared.

Ethics approval All research generated from this study was approved by the University of Edinburgh's Human Ethics Review Committee (HERC).

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement All data relevant to the study are included in the article.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, an indication of whether changes were made, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iD

Cathy Mary Dwyer <http://orcid.org/0000-0001-7511-2056>

REFERENCES

- 1 PDSA paw report, 2018. Available: www.pdsa.org.uk [Accessed Nov 2018].
- 2 Clark CC, Gruffydd-Jones T, Murray JK. Number of cats and dogs in UK welfare organisations. *Vet Rec* 2012;170.
- 3 Stavisky J, Brennan ML, Downes M, et al. Demographics and economic burden of unowned cats and dogs in the UK: results of a 2010 census. *BMC Vet Res* 2012;8:163.
- 4 Gunther I, Raz T, Klement E. Association of neutering with health and welfare of urban free-roaming cat population in Israel, during 2012-2014. *Prev Vet Med* 2018;157:26-33.
- 5 Dantas-Divers LMS, Crowell-Davis SL, Alford K, et al. Agonistic behavior and environmental enrichment of cats communally housed in a shelter. *J Am Vet Med Assoc* 2011;239:796-802.
- 6 Ramos D, Reche-Junior A, Fragoso PL, et al. Are cats (Felis catus) from multi-cat households more stressed? Evidence from assessment of fecal glucocorticoid metabolite analysis. *Physiol Behav* 2013;122:72-5.
- 7 Heath S. Common feline problem behaviours: unacceptable indoor elimination. *J Feline Med Surg* 2019;21:199-208.
- 8 Farnworth MJ, Chen R, Packer RMA, et al. Flat feline faces: is brachycephaly associated with respiratory abnormalities in the domestic cat (Felis catus)? *PLoS One* 2016;11:e0161777.

- 9 Steagall PV, Monteiro BP. Acute pain in cats: recent advances in clinical assessment. *J Feline Med Surg* 2019;21:25–34.
- 10 Buckland EL, Corr SA, Abeyesinghe SM, *et al.* Prioritisation of companion dog welfare issues using expert consensus. *Anim Welf* 2014;23:39–46.
- 11 Horseman SV, Buller H, Mullan S, *et al.* Current welfare problems facing horses in Great Britain as identified by equine stakeholders. *PLoS One* 2016;11:e0160269.
- 12 Kirkland JK, Sainsbury AW, Bennet PM. The welfare of free-living wild animals: methods of assessment. *Anim Welf* 1994;3:57–273.
- 13 Buckland EL, Whiting MC, Abeyesinghe SM, *et al.* A survey of stakeholders' opinions on the priority issues affecting the welfare of companion dogs in Great Britain. *Animal Welfare* 2013;22:239–53.
- 14 Rioja-Lang FC, Bacon H, Connor M, *et al.* Rabbit welfare: determining priority welfare issues for rabbits in the UK using a modified Delphi method. *Veterinary Record Open* 2019. Submitted.
- 15 Crowell-Davis SL, Curtis TM, Knowles RJ. Social organization in the cat: a modern understanding. *J Feline Med Surg* 2004;6:19–28.
- 16 Bradshaw JWS. Sociality in cats: a comparative review. *J Vet Behav* 2016;11:113–24.
- 17 Finka LR, Ellis SLH, Stavisky J. A critically appraised topic (cat) to compare the effects of single and multi-cat housing on physiological and behavioural measures of stress in domestic cats in confined environments. *BMC Vet Res* 2014;10:73.
- 18 Lichtsteiner M, Turner DC. Influence of indoor-cat group size and dominance RANK on urinary cortisol levels. *Anim Welf* 2008;17:215–37.
- 19 Ramos D, Arena MN, Reche-Junior A, *et al.* Factors affecting faecal glucocorticoid levels in domestic cats (*Felis catus*): a pilot study with single and large multi-cat households. *Anim Welf* 2012;21:285–91.
- 20 Sandøe P, Nørspang AP, Forkman B, *et al.* The burden of domestication: a representative study of welfare in privately owned cats in Denmark. *Anim Welf* 2017;26:1–10.
- 21 Rochlitz I. A review of the housing requirements of domestic cats (*Felis silvestris catus*) kept in the home. *Appl Anim Behav Sci* 2005;93:97–109.
- 22 Bernstein PL, Friedmann E. Social behaviour of domestic cats in the human home. In: Turner DC, Bateson P, eds. *The domestic cat: the biology of its behaviour*. 3rd edn. Cambridge University Press, 2014: 71–80.
- 23 Casey RA, Vandenbussche S, Bradshaw JWS, *et al.* Reasons for Relinquishment and Return of Domestic Cats (*Felis Silvestris Catus*) to Rescue Shelters in the UK. *Anthrozoös* 2009;22:347–58.
- 24 Heath SE. Behaviour problems and welfare. In: Rochlitz I, ed. *The welfare of cats*. Netherlands: Springer, 2007: 91–118.
- 25 Gates MC, Zito S, Harvey LC, *et al.* Assessing obesity in adult dogs and cats presenting for routine vaccination appointments in the North Island of New Zealand using electronic medical records data. *N Z Vet J* 2019;67:126–33.
- 26 Bartges JW. Chronic kidney disease in dogs and cats. *Vet Clin North Am Small Anim Pract* 2012;42:669–92.
- 27 Gunn-Moore DA. Cognitive dysfunction in cats: clinical assessment and management. *Top Companion Anim Med* 2011;26:17–24.
- 28 Landsberg GM, Denenberg S, Araujo JA. Cognitive dysfunction in cats: A syndrome we used to dismiss as 'old age'. *J Feline Med Surg* 2010;12:837–48.
- 29 Murray JK, Gruffydd-Jones TJ. Proportion of PET cats registered with a veterinary practice and factors influencing registration in the UK. *Vet J* 2012;192:461–6.
- 30 Rebuelto M. Ethical dilemmas in euthanasia of small companion animals. *The Open Ethics Journal* 2008;2:21–5.
- 31 Gates MC, Hinds HJ, Dale A. Preliminary description of aging cats and dogs presented to a new Zealand first-opinion veterinary clinic at end-of-life. *N Z Vet J* 2017;65:313–7.
- 32 Heuberger R, Petty M, Huntingford J. Companion animal owner perceptions, knowledge, and beliefs regarding pain management in end-of-life care. *Top Companion Anim Med* 2016;31:152–9.
- 33 Reynolds CA, Oyama MA, Rush JE, *et al.* Perceptions of quality of life and priorities of owners of cats with heart disease. *J Vet Int Med* 2010;24:1421–6.
- 34 Öhlund M, Palmgren M, Holst BS. Overweight in adult cats: a cross-sectional study. *Acta Vet Scand* 2018;60:5.
- 35 Rowe EC, Browne WJ, Casey RA, *et al.* Early-life risk factors identified for owner-reported feline overweight and obesity at around two years of age. *Prev Vet Med* 2017;143:39–48.
- 36 Teng KT, McGreevy PD, Toribio J-ALML, *et al.* Strong associations of nine-point body condition scoring with survival and lifespan in cats. *J Feline Med Surg* 2018;20:1110–8.
- 37 German AJ. The growing problem of obesity in dogs and cats. *J Nutr* 2006;136:1940S–6.
- 38 Rowe E, Browne W, Casey R, *et al.* Risk factors identified for owner-reported feline obesity at around one year of age: dry diet and indoor lifestyle. *Prev Vet Med* 2015;121:273–81.
- 39 Flanagan J, Bissot T, Hours M-A, *et al.* An international multi-centre cohort study of weight loss in overweight cats: differences in outcome in different geographical locations. *PLoS One* 2018;13:e0200414.
- 40 Robertson SA, Taylor PM. Pain management in cats—past, present and future. Part 2. treatment of pain—clinical pharmacology. *J Feline Med Surg* 2004;6:321–33.
- 41 Merola I, Mills DS. Systematic review of the behavioural assessment of pain in cats. *J Feline Med Surg* 2016;18:60–76.
- 42 Reid J, Scott EM, Calvo G, *et al.* Definitive Glasgow acute pain scale for cats: validation and intervention level. *Vet Rec* 2017;180:449.2–449.
- 43 Brondani JT, Mama KR, Luna SPL, *et al.* Validation of the English version of the UNESP-Botucatu multidimensional composite pain scale for assessing postoperative pain in cats. *BMC Vet Res* 2013;9:143.
- 44 Robertson SA. Assessment and management of acute pain in cats. *J Vet Emerg Crit Care* 2005;15:261–72.
- 45 Emmerson T. Brachycephalic obstructive airway syndrome: a growing problem. *J Small Anim Pract* 2014;55:543–4.
- 46 Serpell JA. How happy is your PET? the problem of subjectivity in the assessment of companion animal welfare. *Animal Welfare* 2019;28:57–66.
- 47 Patronek G. Animal hoarding: A third dimension of animal abuse. In: Ascione FR, ed. *International Handbook of animal abuse and cruelty: theory, research and application*. Purdue University Press, 2008: 221–46.
- 48 Reinisch AI. Understanding the human aspects of animal hoarding. *Can Vet J* 2008;49:1211–4.
- 49 Calvo P, Duarte C, Bowen J, *et al.* Characteristics of 24 cases of animal hoarding in Spain. *Animal Welfare* 2014;23:199–208.
- 50 Dybdall K, Strasser R, Katz T. Behavioral differences between owner surrender and stray domestic cats after entering an animal shelter. *Appl Anim Behav Sci* 2007;104:85–94.
- 51 Wagner D, Hurley K, Stavisky J. Shelter housing for cats: principles of design for health, welfare and rehoming. *J Feline Med Surg* 2018;20:635–42.
- 52 Kry K, Casey R. The effects of hiding enrichment on stress levels and behaviour of domestic cats (*Felis silvestris catus*) in a shelter setting and the implications for adoption potential. *Animal Welfare* 2007;16:375–83.
- 53 Boulkedid R, Abdoul H, Loustau M, *et al.* Using and reporting the Delphi method for selecting healthcare quality indicators: a systematic review. *PLoS One* 2011;6:e20476.
- 54 Hasson F, Keeney S, McKenna H. Research guidelines for the Delphi survey technique. *J Adv Nurs* 2000;32:1008–15.